The SimpleRate class

Simplified detection rate computation with SNEWPY

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The SNEWPY pipeline

GLoBES as a detection rate computation engine:

- Quick modeling of **any type** of neutrino experiment
- Interaction kinematics and resolution → **single smearing matrix**
- Detection efficiency and backgrounds from input files
- Models neutrino oscillations and computes systematics

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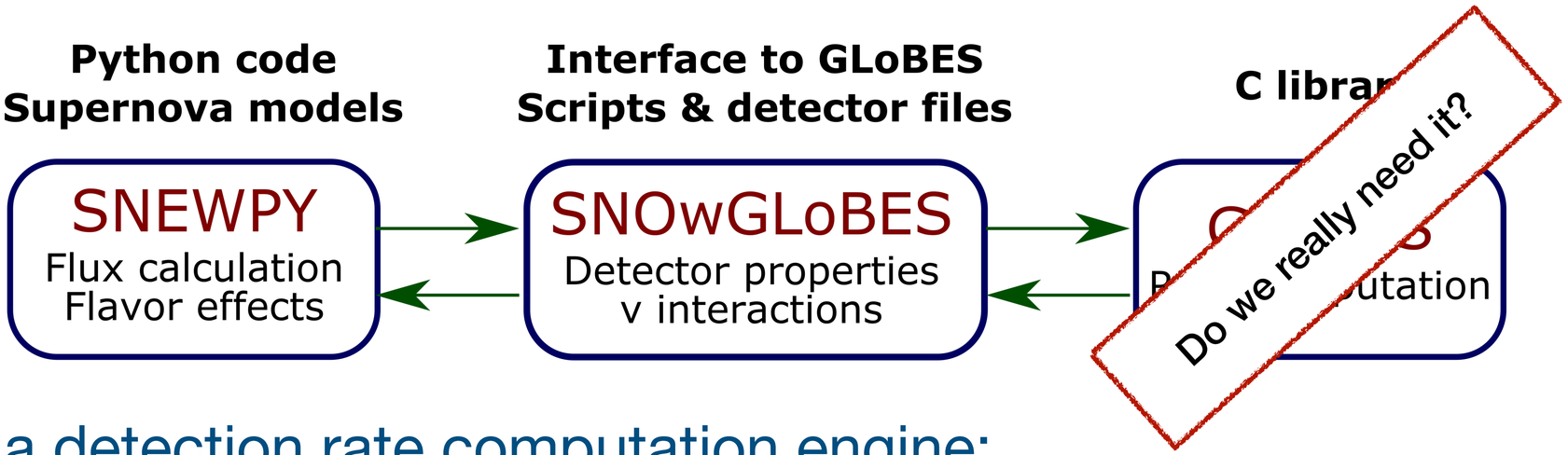

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- Quick modeling of **any type** of neutrino experiment
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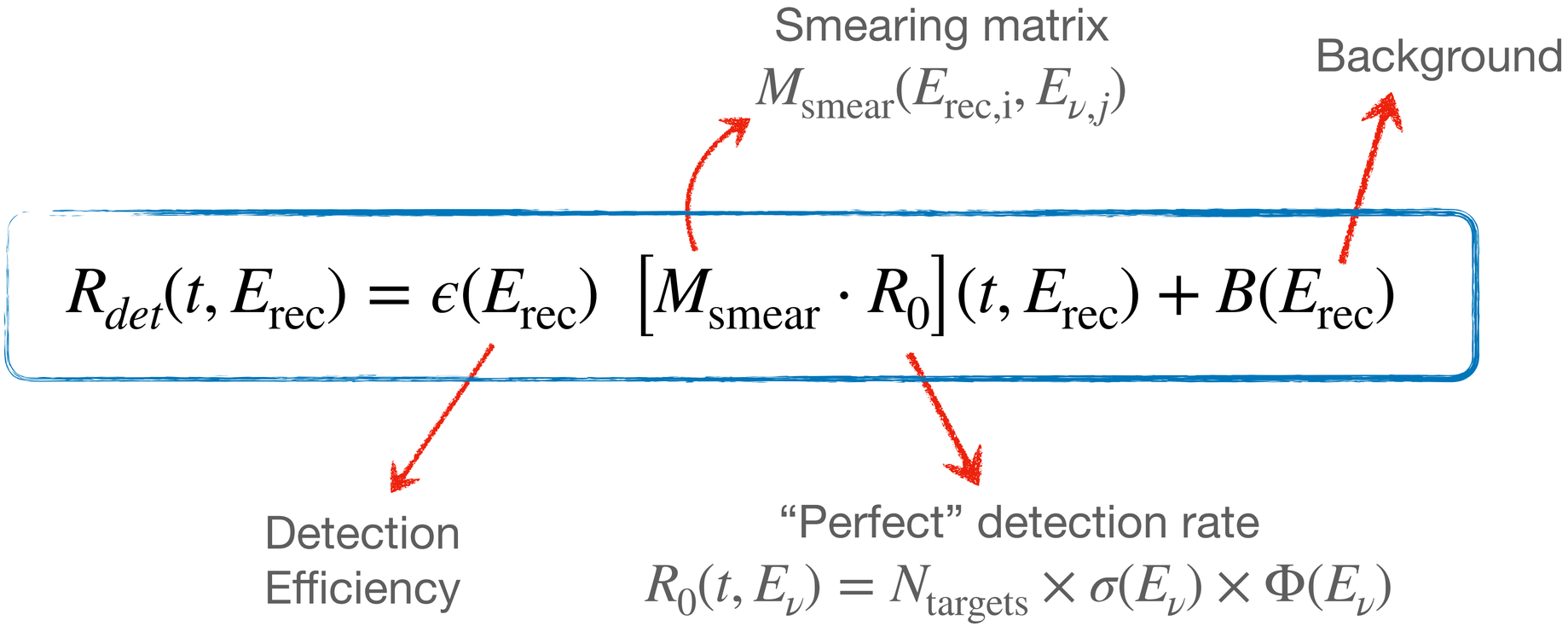
Simple rate computation

From GLoBES to SNEWPY



- Fluxes and flavor transformations computed in SNEWPY
- Cross-sections, efficiencies, smearing files available in SNoWGLoBES

The SNoWGLoBES class

Interface to SNoWGLoBES for computing detection rates

- Identify experiment and look up detector's configuration in SNoWGLoBES
- List efficiency, smearing, cross-section file names from SNoWGLoBES
- Edit SNoWGLoBES parameter file
- Execute SNoWGLoBES script to call GLoBES

Cannot run processes in parallel!

- Gather SNoWGLoBES outputs in Pandas dataframe
- Working test suite with Super-Kamiokande, NOvA, HALO, IceCube

The SimpleRate class

Interface to SNoWGLoBES for computing detection rates

- Identify experiment and look up detector's configuration in SNoWGLoBES
- List efficiency, smearing, cross-section file names from SNoWGLoBES
- ~~Edit SNoWGLoBES parameter file~~ Store efficiencies, smearings, cross-sections
- ~~Execute SNoWGLoBES script to call GLoBES~~ Compute rates within class
- Gather ~~SNoWGLoBES outputs~~ rate arrays in Pandas dataframe

We can define a custom output directory

- Working test suite with Super-Kamiokande, NOvA, HALO, IceCube

New SNEWPY dependency installation

cd ~

mkdir opt

cd opt

~~wget https://www.mpi-hd.mpg.de/personalhomes/globes/download/globes-3.2.17.tar.gz~~

~~tar -zxf globes-3.2.17.tar.gz~~

~~cd globes-3.2.17/~~

~~./configure --prefix=~/opt/globes-3.2.17-install --disable-binary~~

~~make~~

~~make install~~

~~cd ~/opt/globes-3.2.17-install~~

~~export GLB_DIR=${PWD}~~

~~cd ..~~

git clone https://github.com/SNOwGLoBES/snowglobes.git

cd snowglobes

export SNOWGLOBES=${PWD}

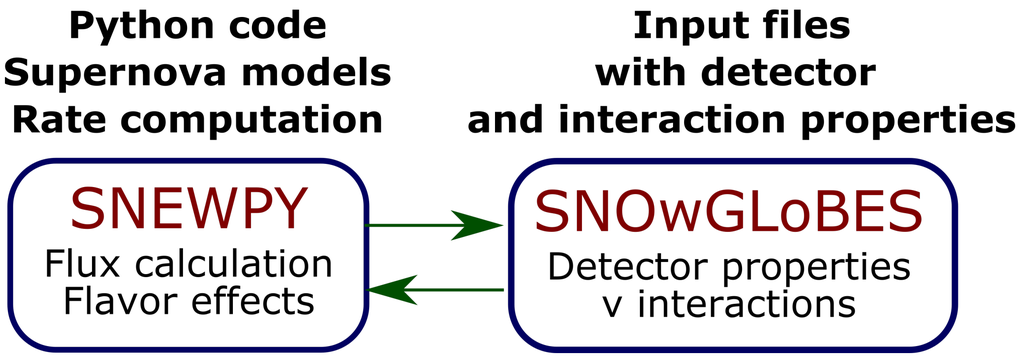
~~cd src~~

~~make~~

~~make install~~

Conclusion and outlook

- Minimal modification to existing SNEWPY code
- Only 1 installation + 1 download needed
- No loss in computation time (NumPy)



Possible caveats, perspectives:

- Heavy reliance on SNoWGLoBES, need to track updates of input file format
- Hardcoded 0.5 MeV binning → custom binning in the future?
- Is there anything else needed from GLoBES which we missed?
- Pull request #193 in https://github.com/SNEWS2/snewpy
  Comments and suggestions are welcome!